ABSTRACT

An object substrate that contains a markingly effective amount of a radiation sensitive marking material such as titanium dioxide is subjected to a patterned pulsed beam of coherent energy having a level of flux density that is at least sufficient to cause the radiation sensitive marking material to change color without degrading the object substrate. The pulsed beam of coherent energy derives its pattern from the instantaneous configuration of individual mirrors on the face of a digital mirror device (DMD) as the energy is reflected from that mirror face. The level of flux intensity at the mirror face is less than the level at which the DMD is at risk of damage or disruption. The level of flux intensity at the object substrate to be marked is sufficient to cause the titanium dioxide to change color, and substantially above the level at which the DMD is at substantial risk of damage or disruption. To accommodate these inconsistent requirements, the cross-section or footprint of a typical pulsed beam of coherent energy is expanded before and condensed after impinging on the mirror face of the DMD. Typically, pulses of coherent energy are serially generated in rapid succession, for example, by a laser, and each pulse possesses a level of flux density that is substantially above the level at which a DMD is at substantial risk of damage or disruption. This permits a DMD to be used to define instantaneously variable patterns or images with which object substrates are marked.